Historic, archived document

Do not assume content reflects current scientific knowledge, policies, or practices.

1
9 84 Mr
ark. Res.-Rep. 7/ 644
. 1

Marketing Research Report No. 644

Effect of Maturity on the Chipping Quality of ...

IRISH COBBLER and KENNEBEC POTATOES

AGRICULTURE
BELTSVILLE BRANCH

UNITED STATES DEPARTMENT OF AGRICULTURE

Agricultural Marketing Service

Market Quality Research Division

Preface

The study on which this report is based is part of a continuing research program by the Agricultural Marketing Service to improve the quality and to reduce spoilage losses of agricultural products during marketing.

The author wishes to express his appreciation to J. M. Lutz, T. M. Whiteman (now retired), W. R. Wright, P. H. Heinze, and J. C. Hansen (now with Colorado State University), Agricultural Marketing Service, for assistance in carrying out the study and preparing the report; to the Red River Valley Potato Growers Association for furnishing the potatoes and for performing the ordinary cultural operations on the experimental plots; to the North Dakota Agricultural Experiment Station, for the use of a special potato planter; to the Silbaugh Manufacturing Co., for furnishing the Humbolt Stalk Cutter, and the Myhra Equipment Co., for furnishing the Brady Stalk Pulverizer.

Contents

Page
Summary ---------- 3
Background of study ---------- 3
Procedure ---------- 4
Results and discussion ---------- 4
  Yield of potatoes ---------- 4
  Chip color ---------- 5
  Chip yield ---------- 7
  Specific gravity ---------- 8
Literature cited ---------- 12

Washington, D. C. March 1964

Effect of Maturity on the Chipping Quality of Irish Cobbler and Kennebec Potatoes

By H. Findlen, *horticulturist*
Market Quality Research Division
Agricultural Marketing Service

Summary

The effect of time of planting, time of vine killing, and time of harvest on the chipping quality of freshly harvested potatoes and of stored potatoes was studied. Irish Cobbler and Kennebec potatoes grown in the Red River Valley of Minnesota-North Dakota were used in this study, which was carried on for four seasons.

With both varieties, late planting resulted in considerably lower yields of potatoes than early or midseason planting. In most instances, the yield was reduced as the interval between vine killing and harvesting was increased. This effect was most striking for the late-planted Kennebecs when vines were killed 21 days before harvest.

Generally, the earlier the potatoes were planted the lighter the color of the chips made at harvesttime and after the potatoes had been stored and reconditioned. The chip color was usually poorer when the vines were killed well in advance of harvest than when they were killed near harvesttime. With the Irish Cobbler variety, early harvest gave slightly lighter chip color than midseason or late harvest, but with the Kennebec variety time of harvest had little consistent effect on chip color. No precise relationship could be established between soil or air temperature and chip color. However, in general, the greater the cumulative number of degree-days the soil temperature was below 50° F., the darker was the color of chips made at harvesttime. When the average soil temperature the week before harvest fell much below the midfifties, chip color was too dark to be acceptable.

With few exceptions, delaying planting reduced chip yield of both varieties. In one year delaying the harvest of Irish Cobblers after killing the vines lowered the chip yield; in the other 2 years, time of vine killing had no consistent effect on chip yields. Increasing the interval between vine killing and harvest of Kennebec potatoes usually lowered the chip yield. Date of harvest had little consistent effect on chip yield.

In general, the higher the specific gravity of the raw potatoes, the higher the chip yield.

Background of Study

Potato-chip manufacturers often experience difficulty in obtaining stocks of potatoes that will process into desirable light-colored chips. Since this difficulty is sometimes encountered after unusually cold weather in the fall, it was suggested that relative maturity, or physiological age, of the potato and soil temperatures during the latter part of the harvesting season might affect the chipping quality.

Experimental work was initiated to determine the effect of maturity on the chipping quality of Irish Cobbler potatoes as affected by (1) early, midseason, and late planting; (2) killing the vines by rotobeating 21, 10, and 1 day before harvesting; and (3) early, midseason, and late harvesting. The work was expanded in the second year to include the Kennebec variety. This publication is a more detailed account of information presented earlier in abstract form (*1*).[1]

---

[1] Italic numbers in parentheses refer to items in Literature Cited, p. 12.

Procedure

The experiment, which was conducted during four seasons, was a 3 x 3 latin square design with early, midseason, and late planting. Each of the three 18-row plots was subdivided into nine 2-row plots 34 feet long and 38 inches wide to which the subtreatments were applied in a 3 x 3 factorial design. The subtreatments consisted of killing the vines 21, 10, and 1 day before harvest, and early, midseason, and late harvest.

Irish Cobblers were used in the first, second, and third years and Kennebecs in the second, third, and fourth years.

The Irish Cobblers and Kennebecs were grown in separate plots; so the two varieties cannot be directly compared with each other.

The following are the dates of planting and dates of harvest for the 4 years:

Year and date harvested	Planted		
	Early	Midseason	Late
First year:			
Early (Sept. 20)	May 18	June 4	June 22
Midseason (Oct. 5)			
Late (Oct. 19)			
Second year:			
Early (Sept. 20)	May 8	May 29	June 19
Midseason (Oct. 3)			
Late (Oct. 13)			
Third year:			
Early (Sept. 19)	May 19	June 4	June 18
Midseason (Oct. 3)			
Late (Oct. 16)			
Fourth year:			
Early (Sept. 21)	May 14	June 2	June 21
Midseason (Oct. 4)			
Late (Oct. 19)			

The potatoes were grown on soil of the Fargo-Bearden series typical of the better soils of the Red River Valley. The soils had been fallowed the previous year. The first year, 235 pounds of 4-24-12 fertilizer (a normal application in this area) was applied at planting time in bands in the row slightly below and to each side of the seed piece. In the remaining years no fertilizer was applied because of the difficulty in applying the fertilizer with available equipment and the known limited response of potatoes to fertilizer on fallow soils in the area (*3*, *4*). Later research (*2*) showed that fertilizers had no important effect on the color of chips prepared from potatoes grown on these soils and only slight effects on chip yield. Cultural operations represented those typical of good commercial practice in the area.

Random samples, each containing 10 tubers and weighing about 2,000 grams, were used for the tests. Chips were prepared from part of the samples within 4 days after harvest. Additional samples were stored in a commercial storage at about 40° F. until February, then reconditioned by storing them for 3 weeks at 80°.

Chips were prepared and their color and yield determined in a manner previously described (*2*). In brief, following abrasion peeling, several transverse slices $^{3}/_{64}$-inch thick were taken from near the center of each potato to make a composite sample weighing exactly 100 grams. The sample was washed in cool tap water, blotted between cotton towels, and fried in peanut oil at 340° F. Each sample was weighed to determine yield and was then scored for color using the following scale: Very dark brown, 50 or less; dark brown, 55 to 60; medium brown (lowest salable grade), 70; light brown, 75 to 85; cream, 90.

Just before reconditioning, each sample was weighed in air and in water. These figures were then used to calculate specific gravity.

Results and Discussion

In none of the 4 years was it possible to kill the vines at all three intervals before harvest for each harvest either because of heavy rains or killing frosts. This presented a problem that prevented statistical analysis of the results.

Yield of Potatoes

With both varieties, late planting usually resulted in a considerable reduction in total yield at all three harvests and, in most instances, a reduction in the percentage of U.S. No. 1, size A, compared with early or midseason planting (tables 1 and 2). With the Kennebec variety, the reduction was greatest in the late-planted plots killed and harvested early.

The effect time of killing the vines had on total yields was not consistent in the first year's tests with Irish Cobblers (table 1). In the second and third years' tests, yields from vines killed 21 days before harvest were usually lower than yields from vines killed 1 or 10 days before harvest.

With a few exceptions, the longer the Kennebec vines were killed before the early harvest, the greater the reduction in yield. This effect was particularly striking for the late-planted plots where killing the vines 21 days before harvest resulted in a 33 to 58 percent decrease in yield below plots killed the day before harvest. As expected, such a large yield reduction also reduced the percentage of U. S. No. 1 size A potatoes. Yields of Kennebecs increased as harvest was delayed.

Chip Color

In general, in all 3 years' tests with the Irish Cobbler variety, the earlier the planting date the lighter the chip color at harvesttime (table 3). Most of the chips prepared from the late planting were too dark to be salable or barely reached the level of acceptability; whereas, except for the midseason and late harvest in the first year, the early-planted plots gave attractive light-brown chips.

In the majority of the cases, the longer the vines were killed before harvest the poorer the chip color.

The effect of date of harvest on chip color is difficult to assess because the vine-killing treatments were not always possible at the prescribed time. From the few valid comparisons that can be made, the early harvest in the first 2 years' tests, on the average, resulted in slightly lighter chip color than the midseason or late harvest. There was little difference between the color of chips from the midseason and late harvests. In the third year's test it appears that delayed harvest slightly improved chip color, probably as a result of warm October weather. The effect was not consistent, however, and was primarily confined to the late planting for midseason and late harvests.

Results were somewhat similar after the potatoes had been stored several months at about 40° F. and reconditioned for 3 weeks at 80°, except that chips from most lots were darker than at harvesttime. Also, the color of chips from these stored potatoes did not differ as

TABLE 1.—Total yield in hundredweight per acre and percent U. S. No. 1, size A of Irish Cobbler potatoes as affected by maturity.

Year and time of harvest	Vines killed before harvest	Planted					
		Early		Midseason		Late	
		Total	U.S. No. 1 size A	Total	U.S. No. 1 size A	Total	U.S. No. 1 size A
	Days	*Cwt.*	*Pct.*	*Cwt.*	*Pct.*	*Cwt.*	*Pct.*
First year:							
Early	10	175	94	224	96	152	95
	1	200	95	214	96	148	92
Midseason	21	199	94	208	94	153	91
	10	193	94	220	96	157	91
Late	21	179	96	216	97	151	93
Average	—	189	95	216	96	152	92
Second year:							
Early	21	139	95	141	96	81	80
	10	144	96	148	96	119	87
	1	147	96	156	96	121	86
Midseason	21	134	96	153	97	110	88
	10	134	96	153	96	125	91
Late	21	134	97	155	95	119	90
Average	—	139	96	151	96	112	87
Third year:							
Early	21	152	94	134	94	89	86
	10	174	95	161	95	145	93
	1	157	95	190	96	140	93
Midseason	21	151	95	167	97	141	93
	10	163	95	161	97	155	95
	1	175	96	174	96	159	94
Late	21	154	95	189	96	158	94
	10	161	96	190	96	140	94
Average	—	161	95	171	96	141	93

TABLE 2.—Total yield in hundredweight per acre and percent U. S. No. 1, size A of Kennebec potatoes as affected by maturity.

Year and time of harvest	Vines killed before harvest	Planted					
		Early		Midseason		Late	
		Total	U.S. No. 1 size A	Total	U.S. No. 1 size A	Total	U.S. No. 1 size A
	Days	*Cwt.*	*Pct.*	*Cwt.*	*Pct.*	*Cwt.*	*Pct.*
Second year:							
Early	21	141	97	107	96	49	76
	10	172	98	161	98	103	94
	1	188	98	150	98	113	93
Midseason	21	174	98	144	99	94	95
	10	178	98	164	99	115	93
Late	21	183	99	162	99	128	96
Average	—	173	98	148	98	100	91
Third year:							
Early	21	128	96	91	92	52	77
	10	156	97	133	96	104	95
	1	170	98	150	97	125	95
Midseason	21	174	98	149	98	115	96
	10	184	98	175	98	151	98
	1	174	98	156	98	156	98
Late	21	203	99	169	98	156	97
	10	192	98	193	98	165	98
Average	—	173	98	152	97	128	94
Fourth year:							
Early	21	162	94	166	91	104	89
	10	206	96	202	94	137	91
	1	225	96	220	95	156	91
Midseason	21	202	96	207	96	153	94
	10	211	97	213	96	143	92
Late	21	234	97	220	96	167	95
Average	—	207	96	205	95	143	92

much among treatments as it did at harvesttime (table 4).

The effects of date of planting on Kennebecs made into chips at harvesttime were somewhat similar to the effects on Irish Cobblers, except that, for the most part, there was little difference in chip color between the midseason and late plantings in the third year (table 5).

For the early harvest in the second year of the tests, killing the vines 10 or 21 days before harvest adversely affected chip color in the late planting but had little consistent effect on the early or midseason planting. For the midseason harvest, on the other hand, killing the vines 21 days before harvest resulted in markedly lighter colored chips than killing 10 days before harvest. This may have been due in part to the regrowth that occurred in the plots rotobeat 21 days before this harvest.

In the third year, killing the vines either 21 or 10 days before harvest usually resulted in poorer chip color than killing 1 day before harvest.

In the fourth year, the effects of vine killing and time of harvest on chip color were not consistent.

After storage and reconditioning, the early planting in the second and third years' tests continued to produce lighter colored chips than the midseason or late plantings, but there was little difference in the latter two plantings (table 6). In the fourth year's test, the late planting produced darker colored chips than the early or midseason, but the differences between the two earlier plantings were not consistent. Almost all lots that year resulted in chips too dark to be salable.

No precise relationship could be established between soil or air temperatures and chip color. However, in general, the greater the number of degree-days the soil temperature was below 50° F., the darker the color of chips made at

TABLE 3.—Color ratings of chips made at harvesttime from Irish Cobbler potatoes as affected by maturity.[1]

Year and time of harvest	Vines killed before harvest	Planted		
		Early	Midseason	Late
	Days			
First year:				
Early	10	72	75	61
	1	80	76	65
Midseason	21	68	61	52
	10	65	62	57
Late	21	69	64	58
Average	—	71	68	59
Second year:				
Early	21	80	77	60
	10	82	77	67
	1	83	78	75
Midseason	21	77	73	70
	10	80	73	72
Late	21	78	72	70
Average	—	80	75	69
Third year:				
Early	21	78	73	61
	10	84	71	57
	1	87	77	66
Midseason	21	83	73	60
	10	81	77	65
	1	86	74	67
Late	21	86	79	70
	10	83	75	70
Average	—	84	75	64

[1] Scale of color ratings: Very dark brown, 50 or less; dark brown, 55 to 60; medium brown (lowest salable grade), 70; light brown, 75 to 85; cream, 90.

TABLE 4.—Color ratings of chips[1] made from Irish Cobbler potatoes after storage and reconditioning as affected by maturity.[2]

Year and time of harvest	Vines killed before harvest	Planted		
		Early	Midseason	Late
	Days			
First year:				
Early	10	69	69	55
	1	72	69	66
Midseason	21	66	71	60
	10	71	70	66
Late	21	69	63	62
Average	—	69	68	62
Second year:				
Early	21	72	57	52
	10	74	67	57
	1	71	70	72
Midseason	21	74	69	62
	10	71	70	72
Late	21	72	66	70
Average	—	72	66	64
Third year:				
Early	21	66	60	48
	10	65	59	47
	1	69	66	54
Midseason	21	70	59	50
	10	66	67	56
	1	69	69	57
Late	21	73	63	58
	10	70	63	62
Average	—	68	63	54

[1] Scale of color ratings: Very dark brown, 50 or less; dark brown, 55 to 60; medium brown (lowest salable grade), 70; light brown, 75 to 85; cream, 90.

[2] Stored at about 40° F. for 4 months, then reconditioned for 3 weeks at 80°.

harvesttime from both Irish Cobbler and Kennebec potatoes (table 7). With Irish Cobblers, if there were more than 9 degree-days below 50°, chip color was too dark to be acceptable. Kennebecs appeared to be more sensitive to low soil temperature; when there were 5 or more degree-days below 50°, chips were too dark to be acceptable. With both varieties when the average soil temperature the week before harvest fell much below the midfifties, chip color was too dark to be acceptable.

Some undetermined factor other than soil temperature must have influenced chip color of Irish Cobblers in the first year and of Kennebecs in the fourth year. Although there were no degree-days below 50° F. up to the early harvest, chips made from Irish Cobblers were barely above and those from Kennebecs were slightly below the level of acceptability. No appreciable change occurred until after about 40 degree-days had accumulated.

These results are somewhat in agreement with those obtained by Smith (*5, 6, 7*). He found that when the average soil temperature and the lowest soil temperature were much below 50° F. for one week before harvest, the chips were likely to be too dark to be acceptable by the trade.

Chip Yield

Average yields of chips from both varieties at harvesttime and after storage and reconditioning are shown in tables 8 to 11. The yields were calculated as a percentage of the weight of peeled, raw, sliced potatoes and therefore are not comparable to commercial yield figures which are based on the weight of unpeeled potatoes.

TABLE 5.—Color ratings of chips made at harvesttime from Kennebec potatoes as affected by maturity.[1]

Year and time of harvest	Vines killed before harvest	Planted		
		Early	Midseason	Late
	Days			
Second year:				
Early	21	73	70	60
	10	75	70	60
	1	72	72	67
Midseason	21	80	72	65
	10	63	60	53
Late	21	73	67	62
Average	—	73	68	61
Third year:				
Early	21	84	73	58
	10	76	69	63
	1	84	79	78
Midseason	21	74	59	58
	10	73	63	61
	1	77	75	78
Late	21	79	61	62
	10	82	63	65
Average	—	79	68	65
Fourth year:				
Early	21	74	74	66
	10	69	72	67
	1	69	73	71
Midseason	21	69	64	66
	10	68	68	65
Late	21	63	61	57
Average	—	69	69	65

[1] Scale of color ratings: Very dark brown, 50 or less; dark brown, 55 to 60; medium brown (lowest salable grade), 70; light brown, 75 to 85; cream, 90.

With few exceptions, delaying planting of the Irish Cobbler variety reduced chip yields. In the second year, the longer the vines were killed before the first harvest, the lower the chip yield. In the other instances, the vine killing treatments had no consistent effect on chip yields. Date of harvest had little consistent effect on chip yields. Somewhat similar results were obtained after storage and reconditioning, except that chip yields were generally higher than at harvesttime. Higher yields were expected because water is lost more rapidly than dry matter during storage and reconditioning.

In most instances, delaying planting of the Kennebec variety reduced the yield of chips prepared at harvesttime. Increasing the interval between vine killing and harvest also reduced the chip yield. There was a trend towards higher chip yields with later harvests. Similar results were obtained following storage and reconditioning, except that, as with the Irish Cobblers, yields were higher.

TABLE 6.—Color ratings of chips[1] made from Kennebec potatoes after storage and reconditioning as affected by maturity.[2]

Year and time of harvest	Vines killed before harvest	Planted		
		Early	Midseason	Late
	Days			
Second year:				
Early	21	67	56	54
	10	78	61	57
	1	79	69	67
Midseason	21	72	64	59
	10	82	71	68
Late	21	78	75	72
Average	—	76	66	63
Third year:				
Early	21	61	55	50
	10	65	56	54
	1	70	65	59
Midseason	21	71	59	59
	10	79	65	67
	1	85	71	72
Late	21	78	68	69
	10	76	70	74
Average	—	73	64	63
Fourth year:				
Early	21	63	59	58
	10	63	69	60
	1	60	66	58
Midseason	21	69	67	62
	10	66	68	65
Late	21	71	75	66
Average	—	65	67	62

[1] Scale of color ratings: Very dark brown, 50 or less; dark brown, 55 to 60; medium brown (lowest salable grade), 70; light brown, 75 to 85; cream, 90.

[2] Stored at 40° F. for 4 months, then reconditioned for 3 weeks at 80°.

Specific Gravity

Specific gravity of all samples of the potatoes taken just prior to reconditioning is given in tables 12 and 13. In general, the higher the specific gravity the higher the chip yield, as would be expected. This is shown by the following correlation coefficients.

Year	Correlation coefficients	
	Irish Cobbler	Kennebec
First	+0.584	—
Second	+0.675	+0.869
Third	+0.731	+0.847
Fourth	—	+0.568

Although all of the correlation coefficients proved to be significant at the 1 percent level, only those for the Kennebec variety in the second and third years' tests exceeded the 0.80

minimum value used for prediction purposes. The cause of this differential behavior between varieties and years is not known, but it may be caused by different rates of oil uptake by the chips.

TABLE 7.—Effect of soil temperatures at a 5-inch depth on color rating of chips made at harvesttime from Irish Cobbler and Kennebec potatoes

Item	Harvest		
	Early	Midseason	Late
First year:			
Irish Cobbler chip color	71	68	59
Mean soil temp. week before harvest, ° F.	57	49	49
Cumulative degree-days below 50° F.[1]	0	42	69
Second year:			
Irish Cobbler chip color	80	75	69
Kennebec chip color	73	68	61
Mean soil temp. week before harvest, ° F.	60	53	45
Cumulative degree-days below 50° F.[1]	0	5	30
Third year:			
Irish Cobbler chip color	84	75	64
Kennebec chip color	79	68	65
Mean soil temp. week before harvest, ° F.	56	53	52
Cumulative degree-days below 50° F.[1]	0	6	9
Fourth year:			
Kennebec chip color	69	69	65
Mean soil temp. week before harvest, ° F.	53	48	45
Cumulative degree-days below 50° F.[1]	0	25	102

[1] Sums of the negative departures of average daily soil temperatures from 50° F.

TABLE 8.—Yields of chips[1] made at harvesttime from Irish Cobbler potatoes as affected by maturity.

Year and time of harvest	Vines killed before harvest	Planted		
		Early	Midseason	Late
	Days	*Pct.*	*Pct.*	*Pct.*
First year:				
Early	10	33.8	33.9	30.0
	1	33.4	32.3	31.5
Midseason	21	32.2	30.9	29.4
	10	32.6	30.6	30.1
Late	21	33.3	32.0	31.4
Average	—	33.1	31.9	30.5
Second year:				
Early	21	31.9	29.5	27.5
	10	31.4	30.7	30.0
	1	32.5	31.8	31.5
Midseason	21	31.1	30.2	30.6
	10	32.5	30.3	29.4
Late	21	33.1	31.3	31.0
Average	—	32.1	30.6	30.0
Third year:				
Early	21	32.6	31.6	30.1
	10	33.5	33.6	31.1
	1	34.3	32.0	33.9
Midseason	21	32.8	32.4	30.2
	10	32.3	33.3	32.8
	1	33.3	32.7	32.9
Late	21	34.4	33.7	32.8
	10	33.8	33.1	33.0
Average	—	33.4	32.8	32.1

[1] Chip yields are expressed as percentage of peeled, raw, sliced potato weight.

TABLE 9.—Yields of chips[1] made from Irish Cobbler potatoes after storage and reconditioning as affected by maturity.[2]

Year and time of harvest	Vines killed before harvest	Planted		
		Early	Midseason	Late
	Days	*Pct.*	*Pct.*	*Pct.*
First year:				
Early	10	34.3	32.7	29.8
	1	33.9	32.7	31.6
Midseason	21	33.9	34.8	30.9
	10	35.6	35.1	31.6
Late	21	34.7	31.9	30.8
Average	—	34.5	33.4	30.9
Second year:				
Early	21	34.8	31.6	30.0
	10	35.7	34.4	31.8
	1	36.0	35.4	33.3
Midseason	21	35.9	34.2	33.3
	10	34.6	34.0	34.8
Late	21	35.0	34.7	33.4
Average	—	35.3	34.0	32.8
Third year:				
Early	21	33.3	31.9	28.9
	10	33.9	33.8	30.3
	1	35.6	34.7	33.9
Midseason	21	34.4	34.6	31.8
	10	34.0	32.5	33.2
	1	33.9	33.3	33.1
Late	21	33.8	33.2	34.3
	10	34.3	33.5	33.3
Average	—	34.2	33.4	32.4

[1] Chip yields are expressed as percentage of peeled, raw, sliced potato weight.

[2] Stored at about 40° F. for 4 months, then reconditioned for 3 weeks at 80°.

TABLE 10.—Yields of chips[1] made at harvest-time from Kennebec potatoes as affected by maturity.

Year and time of harvest	Vines killed before harvest	Planted		
		Early	Midseason	Late
	Days	*Pct.*	*Pct.*	*Pct.*
Second year:				
Early	21	29.4	28.3	27.2
	10	29.9	28.8	28.0
	1	31.3	32.1	32.5
Midseason	21	30.3	29.1	28.2
	10	34.0	33.9	33.5
Late	21	31.9	30.6	29.5
Average	—	31.1	30.5	29.8
Third year:				
Early	21	31.6	29.2	28.2
	10	31.2	30.3	28.7
	1	32.7	31.1	31.1
Midseason	21	31.1	29.3	28.7
	10	32.0	31.5	30.9
	1	32.4	32.4	32.6
Late	21	34.6	31.9	32.2
	10	33.2	33.6	33.5
Average	—	32.4	31.2	30.7
Fourth year:				
Early	21	32.1	29.9	29.8
	10	30.4	31.3	30.3
	1	31.8	32.2	33.0
Midseason	21	30.9	30.7	30.4
	10	31.1	31.4	31.4
Late	21	30.3	30.5	30.4
Average	—	31.1	31.0	30.9

[1] Chip yields are expressed as percentage of peeled, raw, sliced potato weight.

TABLE 11.—Yields of chips[1] made from Kennebec potatoes after storage and reconditioning as affected by maturity.[2]

Year and time of harvest	Vines killed before harvest	Planted		
		Early	Midseason	Late
	Days	*Pct.*	*Pct.*	*Pct.*
Second year:				
Early	21	33.1	30.8	29.7
	10	34.6	31.6	30.1
	1	35.5	33.8	33.9
Midseason	21	34.0	32.3	31.6
	10	34.6	34.6	33.8
Late	21	35.6	35.5	32.9
Average	—	34.6	33.1	32.0
Third year:				
Early	21	31.2	29.4	29.8
	10	32.1	31.0	28.8
	1	34.8	32.3	32.0
Midseason	21	33.2	30.2	28.8
	10	33.3	32.1	31.6
	1	33.6	33.5	32.3
Late	21	34.8	32.2	33.5
	10	32.8	33.9	33.9
Average	—	33.2	31.8	31.3
Fourth year:				
Early	21	31.0	30.5	30.1
	10	31.5	31.5	30.4
	1	32.1	32.0	32.4
Midseason	21	32.1	31.2	30.3
	10	31.6	31.3	31.6
Late	21	32.7	32.5	32.0
Average	—	31.8	31.5	31.1

---

[1] Chip yields are expressed as percentage of peeled, raw, sliced potato weight.

[2] Stored at about 40° F. for about 4 months, then reconditioned for 3 weeks at 80°.

TABLE 12.—Specific gravity of Irish Cobbler potatoes as affected by maturity.

Year and time of harvest	Vines killed before harvest	Planted		
		Early	Midseason	Late
	Days			
First year:				
Early	10	1.0860	1.0816	1.0714
	1	1.0889	1.0843	1.0819
Midseason	21	1.0838	1.0877	1.0781
	10	1.0862	1.0840	1.0796
Late	21	1.0899	1.0852	1.0818
Average	—	1.0870	1.0846	1.0786
Second year:				
Early	21	1.0889	1.0836	1.0696
	10	1.0915	1.0881	1.0834
	1	1.0907	1.0887	1.0862
Midseason	21	1.0895	1.0885	1.0848
	10	1.0901	1.0881	1.0848
Late	21	1.0938	1.0860	1.0853
Average	—	1.0908	1.0872	1.0824
Third year:				
Early	21	1.0819	1.0819	1.0665
	10	1.0866	1.0841	1.0717
	1	1.0860	1.0868	1.0807
Midseason	21	1.0853	1.0838	1.0748
	10	1.0845	1.0850	1.0831
	1	1.0857	1.0866	1.0851
Late	21	1.0865	1.0867	1.0844
	10	1.0864	1.0875	1.0860
Average	—	1.0854	1.0853	1.0790

TABLE 13.—Specific gravity of Kennebec potatoes as affected by maturity.

Year and time of harvest	Vines killed before harvest	Planted		
		Early	Midseason	Late
	Days			
Second year:				
Early	21	1.0778	1.0715	1.0655
	10	1.0832	1.0768	1.0691
	1	1.0899	1.0890	1.0854
Midseason	21	1.0816	1.0799	1.0732
	10	1.0882	1.0859	1.0835
Late	21	1.0868	1.0856	1.0811
Average	—	1.0846	1.0814	1.0763
Third year:				
Early	21	1.0671	1.0668	1.0617
	10	1.0749	1.0674	1.0655
	1	1.0816	1.0810	1.0766
Midseason	21	1.0777	1.0682	1.0657
	10	1.0798	1.0786	1.0756
	1	1.0848	1.0813	1.0824
Late	21	1.0829	1.0811	1.0775
	10	1.0817	1.0840	1.0864
Average	—	1.0788	1.0760	1.0739
Fourth year:				
Early	21	1.0707	1.0736	1.0707
	10	1.0747	1.0769	1.0755
	1	1.0774	1.0812	1.0792
Midseason	21	1.0772	1.0740	1.0737
	10	1.0797	1.0834	1.0783
Late	21	1.0804	1.0778	1.0776
Average	—	1.0767	1.0778	1.0758

Literature Cited

(1) FINDLEN, H.
1955. EFFECT OF MATURITY ON THE CHIPPING QUALITY OF IRISH COBBLER AND KENNEBEC POTATOES. (Abs.) Potato Chipper 14(11): 30.

(2) ______________
1960. EFFECT OF FERTILIZER ON THE CHIPPING QUALITY OF FRESHLY HARVESTED AND STORED RED RIVER VALLEY POTATOES. Amer. Potato Jour. 37: 85-89.

(3) NORUM, E. B., YOUNG, R. A., and ZUBRISKI, J. C.
1953. NITROGEN BOOSTS POTATO YIELDS. N. Dak. Agr. Expt. Sta. Bimonthly Bul. XV: 150-151.

(4) ROST, C. O., KRAMER, H. W., and MCCALL, T. M.
1945. FERTILIZERS FOR POTATOES IN THE RED RIVER VALLEY. Minn. Agr. Expt. Sta. Bul. 385, 16 pp.

(5) SMITH, O.
1958. POTATO RESEARCH PROGRESS. Prod. and Tech. Div. Mtgs. Natl. Potato Chip. Inst., Proc. pp. 11-15.

(6) ______________
1959. PROGRESS IN POTATO CHIP RESEARCH. Prod. and Tech. Div. Mtgs. Potato Chip Inst. Internatl., Proc. pp. 3-6.

(7) ______________
1960. POTATO CHIP RESEARCH IN 1959. Prod. and Tech. Div. Mtgs. Potato Chip Inst. Internatl., Proc. pp. 15-20.

U. S. DEPARTMENT OF AGRICULTURE
Agricultural Marketing Service
Washington, D. C. 20250
- - -
Official Business

Postage and Fees Paid
U. S. Department of Agriculture